

24/08/04

### A Dispenser

The present invention relates to a dispenser. More particularly, the present invention relates to a dispenser for selectively dispensing material into a container.

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It is known to sell pre-mixed alcoholic and non-alcoholic beverages. Examples of such beverages include pre-mixed gin and tonic, whisky and cola, rum and fruit juice, rum and cola, mineral water and fruit cordial as well as milkshakes and "smoothies". However, in some instances the taste of such pre-mixed drinks may degrade if left on the shelf for an extended period prior to consumption. In other instances the mixed components may react together such that the mixture may no longer be drinkable or effective if not consumed or utilised almost immediately. An example of such a mixture would be that of water and an effervescent indigestion or cold remedy.

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Whilst the aforementioned problems may be overcome by keeping the two components separate until consumption of a mixture comprising both components is desired, it is often inconvenient to store and carry both components separately prior to mixing. Furthermore, the act of mixing the components may lead to spillage, contamination and additional inconvenience to the consumer.

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The present invention seeks to overcome, or at least mitigate, the problems of the prior art.

Accordingly one aspect of the present invention provides a dispenser comprising attachment means for attachment to a container, a reservoir for holding material, a barrier means to prevent the material entering the container, wherein the barrier means is removable by manipulation of the dispenser, thereby permitting the material to be selectively dispensed into the container.

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Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:

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FIGURE 1 is a perspective view of a dispenser according to one embodiment of the present invention fitted to a container;

5      FIGURE 2 is a plan view of the dispenser of Figure 1 in a closed condition;

FIGURE 3 is a plan view of the dispenser of Figure 1 in an open condition;

10      FIGURE 4 is a cross-sectional view through the dispenser of Figure 2 along the axis X-X;

FIGURE 5 is a cross-sectional view through the dispenser of Figure 3 along the axis Y-Y;

15      FIGURE 6 is an axial cross-sectional view through a dispenser according to a second embodiment of the present invention in a closed condition;

20      FIGURE 7 is an axial cross-sectional view through the dispenser of Figure 6 in an open condition;

FIGURE 8 is an axial cross-sectional view through a dispenser according to a third embodiment of the present invention in a closed condition;

25      FIGURE 9 is an axial cross-sectional view through a dispenser according a fourth embodiment of the present invention in a closed condition;

FIGURE 10 is an axial cross-sectional view through the dispenser of Figure 9 in an open condition;

30      FIGURE 11 is an axial cross-sectional view through a dispenser according to a fifth embodiment of the present invention in a closed condition;

FIGURE 12 is an axial cross-sectional view through the dispenser of Figure 11 in an open condition;

FIGURE 13 is an exploded cross-sectional view through a dispenser according to a sixth embodiment of the present invention;

FIGURE 14 is a cross-sectional view through a dispenser according to a seventh embodiment of the present invention;

FIGURE 15 is a cross-sectional view through a dispenser according to an eighth embodiment of the present invention;

FIGURES 16 and 17 are vertical cross-sectional views through a dispenser according to a ninth embodiment of the present invention in closed and open condition respectively;

FIGURES 18 and 19 are cross-sectional views along the axes A-A and B-B of figures 16 and 17;

FIGURES 20, 21 and 22 are cross-sectional views through a dispenser according to a tenth embodiment of the present invention in the closed, open and sports cap lifted states respectively;

FIGURES 23 and 24 are vertical cross-sectional views through a dispenser according to an eleventh embodiment of the present invention in a closed and open condition respectively;

FIGURES 25 and 26 are vertical cross-sectional views through a twelfth embodiment of the present invention in a closed and open condition respectively;

FIGURE 27 is a cross-sectional view through a dispenser according to a thirteenth embodiment of the present invention;

FIGURE 27A is an enlarged cross-sectional view of a portion of Figure 27;

FIGURE 28 is a perspective view of a portion of a dispenser according to a fourteenth embodiment of the present invention; and

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FIGURES 28A and 28B are plan and side views of the a portion of the dispenser of Figure 28 from the directions indicated by arrows J and K respectively.

10 Referring to Figure 1, a dispenser indicated generally at 10 according to one embodiment of the present invention is a screw fitted to a container 12, such as a bottle, jar or the like.

15 The dispenser comprises a first upper portion indicated generally at 14 and a second lower portion indicated generally at 16. It can be seen that both the first and second portions 14 and 16 are generally cylindrical in shape, being mounted about a common axis 15, with the upper portion being closed off to define a reservoir 22 containing a liquid 20. It can be seen that in this embodiment the major part of the first portion 14 is formed from transparent material 18 (eg transparent plastics) with the remainder having a textured or knurled first engagement portion 24 to assist a user in gripping the first portion 14. In other classes of embodiment, the reservoir may be entirely opaque, entirely transparent, entirely translucent, and/or the engagement portion 14 may be increased in size. A similar textured surface 26 is provided on the second portion 16. Examples of suitable materials from which the dispenser may be made include polyethylene terephthalate (PET) and polypropylene.

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30 The first and second portions 14 and 16 are arranged so as to permit relative rotational movement therebetween to occur about their common axis 15. However, as shown in Figure 1, a tear-off band 28 frangibly connects the first and second portion 14 and 16 and preferably acts to both reduce the risk of accidental relative rotation occurring and to indicate whether the dispenser has been tampered with or used. The band 28 is provided with a projecting portion 30 that enables a user of the dispenser to grasp the band and remove it, as is well known. In other embodiments, the band 28 may be

replaced by a direct frangible connection between the portions 14 and 16. A further frangible connection (not shown) may be provided between the dispenser 10 and the container 12 for similar reasons.

5 Referring now to Figures 2 and 4 which respectively illustrate plan and cross-sectional views through the dispenser 10 when in a closed condition, it can be seen that the first portion 14 additionally comprises a first wall 32 having, in this embodiment, two through holes 34 provided therein in an opposed radially equidistant position relative to the axis 15. The position, number and size of the hole(s) 34 may be adjusted as required  
10 in other embodiments.

It can be seen that the first wall 32 is, in this embodiment, formed integrally with the first engagement portion 24, and furthermore that the intersection of the lower wall 32 and engagement portion 24 defines an annular undercut 36 to facilitate the engagement  
15 of the first portion 14 with a co-operating toothed ring 38 of the second portion 16.

The second portion 16 comprises a second wall 40 formed integrally with the second engagement portion 26. A toothed ring 38 extends upwardly from wall 40, the teeth 39 of which are arranged to engage with undercuts 36 of the first portion. The toothed ring  
20 38 may be continuous or may have gaps therein to allow the teeth to flex more easily and thereby ease the assembly process. It is however preferable that at least a leg portion 48 of the ring 38 is continuous to improve the seal between the first and second portions 14 and 16.

25 The second wall 40 is provided with two through holes 42 radially equidistant from the axis 15 with respect to the through holes 34 of wall 32. The second wall 40 is in a face contacting relationship with first wall 32. However, in the position shown in Figure 2 holes 42 are circumferentially offset from holes 34 by approximately 90 degrees. The combination of the face contacting relationship of walls 32 and 40 and offset of the  
30 holes 34 and 42 means that there is no path for the liquid 20 to pass through the walls, which together define a barrier means.

It can be seen that the second engagement portion 26 is provided with threads 44 on its radially inner face to engage with co-operating threads 46 on the container. It will be appreciated that in alternative classes of embodiment, the second portion 16 may be provided with any suitable alternative means of engagement with the container 12 such as a simple frictional push fit, clip fitting or a frangible connection.

Turning now to Figures 3 and 5 the dispenser 10 is shown in an open or operative position. A user of the dispenser has removed band 28 and turned the first portion 14 in a clockwise direction A through substantially 90 degrees about axis 15 with respect to the second portion 16. A detent or stop (not shown) may be provided at a suitable position on either the first or second portions 14 and 16 to limit the extent of rotation possible. In other embodiments, the first portion 14 may be capable of being turned anticlockwise only, or both clockwise and anticlockwise.

It can be seen that this rotation aligns through holes 34 in wall 32 with the corresponding through holes 42 in wall 40. This enables the liquid 20 in the reservoir 22 to pass through the holes 34 and 40 in a direction B into the container to which the dispenser 10 is attached. Thereafter, the user may shake the container to ensure a thorough mixing of the liquid 20 with liquid (not shown) held within the container 12 is achieved, before grasping portion 26 and unscrewing the dispenser 10 to enable the mixed contents of container 12 to be consumed or used. In some classes of embodiment, rather than removing the entire dispenser 10, it may be possible to detach the first portion 14 from the second portion 16 to enable the contents in container 12 to be poured out through holes 42.

In other classes of embodiment, rotation of the first portion with respect to the second portion may allow material to pass through the barrier means by use of alternative mechanisms to that described above. For example, a ramp or thread may be provided on one of the first or second portions with a complementary formation being provided on the other portion or a separate insert, so as to translate relative rotation between the portions into a relative axial motion thereby removing a plug or the like in a wall constituting the barrier means.

Turning now to a second embodiment of the present invention as illustrated in Figures 6 and 7, like numerals have, wherever possible, been used for like parts of the dispenser with the addition of the prefix "1". Only the differences of the second embodiment  
5 with respect to the first embodiment are discussed in further detail.

It can be seen that the dispenser 110 according to the second embodiment of the present invention again comprises first and second portions 114 and 116. First and second walls 132 and 140 are again provided on the first and second portions 114 and 116  
10 respectively. Walls 132 and 140 again define a barrier means between the reservoir 122 and the container. The walls 132 and 140 are inclined to form a frustro-conical or funnel-like shape.

A hole 134 is provided at the centre of wall 132 and has a cylindrical extension 150  
15 extending downwardly therefrom terminating at a pointed circular tip 152. The tip 152 is arranged so as to contact a correspondingly dimensioned disc 154 positioned at the centre of wall 140. The periphery of the disc 154 is preferably weakened (eg by thinning the material at the interface between the funnel portion and the disc 154). To improve the seal between the tip 152 and its point of contact with the disc 154, this  
20 region may be provided with suitable sealing material (eg an elastomeric material such as synthetic rubber).

The first portion 114 and second portion 116 engage together by means of a radially outwardly projecting lip or rim 156 of the second portion co-operating with a radially  
25 inwardly directing lip or rim 158 of the first portion 114. A recessed cylindrical region 160 of the second portion is provided beneath rim 156 to enable the first portion 114 to slide downwardly with respect to the second portion 116. The extent of sliding movement is restricted by an annular stop surface 162 provided at the lower extent of the recessed region 160.

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To dispense liquid 120 from the reservoir 122 into the container 112 a user removes band 128 that hitherto substantially prevented vertical sliding movement, before

pushing downwardly on the first portion 114. This downward pressure causes the tip 152 to detach the majority of disc 154 from the remainder of wall 140 whilst preferably enabling the disc to remain connected to a part of the wall (so that it does not fall into the container). Once the disc 154 is displaced, the liquid 120 flows in a direction C  
5 from reservoir 122 into container 112. The funnel shape of wall 132 ensures that substantially all of the liquid is dispensed into the container 112. As in the first embodiment the mixture of liquids in container 112 may then be poured out of the container once the dispenser 110 has been unscrewed therefrom.

10 Referring to Figure 8 which illustrates a third embodiment of the present invention, like parts have been indicated by like numerals with the addition of the prefix "2". It can be seen that the dispenser 210 of the third embodiment operates using a similar principle to the dispenser 110 of the second embodiment. However, in this embodiment the second wall 240 of the second portion 216 merely acts to suspend one or more piercing tip(s)  
15 252 to pierce the first wall 232 of the first portion 214, the wall 232 in this embodiment being in the form of a piercable plastics membrane. Wall 240 need not therefore be in the form of an uninterrupted surface to act as a seal, rather it merely needs to be sufficiently strong to be able to support the tip 252 during the piercing operation. Thus, in this embodiment only wall 232 acts as the barrier means. Note that extension 250 is  
20 not in the form of an uninterrupted cylinder. Instead, notches 253 are provided therein.

To dispense the liquid 220, the user removes band 128 and presses downwardly on the first portion 214 in a similar manner to the second embodiment, thus bringing wall 232 into contact with the tip 252 of hole 234. This downward movement causes the wall  
25 232 to be pierced, thus forming a hole or holes in wall 232 through which the liquid 220 may be dispensed into the container 212. Notches 253 ensure that substantially all of the liquid 220 may be easily dispensed and may also act to ease the piercing operation.

A fourth embodiment of the present invention is shown in Figures 9 and 10 in which  
30 like parts are again, wherever possible, designated by like numerals with the addition of the prefix "3". In this embodiment, walls 332 and 340 are again provided with two holes 334 and two holes 342 respectively that are offset with relation to each other in a



similar manner to the arrangement shown in Figure 2. As in the first embodiment, when the dispenser is in a closed condition, wall 332 is in a face contacting relationship with wall 340, thus preventing liquid 320 flowing from the reservoir 322 into the container 312.

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To remove the barrier means created by walls 332 and 340, a user lifts the first portion 314 with respect to the second portion 316. The extent of this movement is limited by engagement of radially outwardly directed lip or rim 358 of the first portion 314 engaging with a corresponding radially inwardly directed lip or rim 356 of the second portion 316. This axial movement of the first portion 314 away from the second portion 316 creates a chamber 370 between the first wall 332 and the second wall 340. The liquid 320 is able to flow into chamber 370 through holes 334 and then out of the chamber through the holes 342 in wall 340, the direction of flow being shown by arrows D. Once the liquid has been dispensed into the container 312, the dispenser 310 may be removed by unscrewing it from the container as in the previous embodiments.

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In alternative classes of embodiment, a vertical guide formation may be provided between the first portion 314 and second portion 316 that only permits axial movement of the first portion relative to the second portion to occur.

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Figure 11 illustrates a fifth embodiment of the present invention, which is essentially a variant of the dispenser 310 of the fourth embodiment shown in Figures 9 and 10. Like parts have been denoted as far as possible by like numerals with the addition of the prefix "4". Only differences with respect to the dispenser of the fourth embodiment are described below.

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Material is dispensed from reservoir 422 into container 412 in the same manner as the fourth embodiment (by lifting first portion 414 with respect to second portion 416). However, the dispenser 410 is provided with a tubular conduit 475 extending through the dispenser from top to bottom to enable the contents of the container 412 to be poured or consumed without the necessity of removing the dispenser from the container.

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To substantially prevent the contents of the container 412 leaking through the conduit 475, a valve means in the form of a plug 476 is provided at the base thereof arranged to seal an aperture 484 in the base of a sleeve-like extension 482 of wall 440. The sleeve-like extension 482 extends into reservoir 422 and is arranged so as to provide a slidable but sealing fit around conduit 475.

The base of conduit 475 tapers inwardly towards plug 476, and holes 480 are provided in the conduit to permit the contents of the container 412 to flow therethrough when the plug is removed from aperture 484.

At its upper end, conduit 475 extends beyond the top of reservoir 422 to provide a convenient drinking or pouring spout. The top of the conduit 475 is preferably closable to minimise the risk of contaminants entering it. In this embodiment a known "sports cap" type closure arrangement 485 is provided. The top of the conduit 475 has a centrally mounted plug 472 standing proud therefrom, the plug being mounted via arms 479 so as to provide apertures 478 through which the contents of the container 412 may pass.

An axially slidable cap 486 of the arrangement 485 encloses and seals the end of the conduit 475, with the upward axial motion being restricted by radially inward facing lip 490 of the cap contacting radially outward facing lip 474 provided on the conduit. In the closed position shown in Figure 11, plug 472 seals a correspondingly sized hole 488 provided in the cap. In alternative classes of embodiment any other suitable form of closure for the conduit 475 may be provided such as a screw or snap-fit cap (not shown). Alternatively, a non-reclosable seal may be provided, such as a peel-off or puncturable membrane, or no seal at all may be provided.

Referring to Figure 12, the contents of the reservoir 422 are dispensed into the container in a similar manner to the fourth embodiment. The relative axial movement between portions 414 and 416 also removes plug 476 from hole 484, meaning that once the contents of reservoir 422 have been dispensed into the container, the mixed material

may then be consumed or poured via the conduit 475 once the cap 485 is opened. Both cap 485 and plug 476 may be reclosed at any time, meaning that a partially full container 412 may be safely stored between uses. Note that conduit 475 prevents the material 420 in the reservoir 422 being directly poured or consumed via sports cap arrangement 485; the material must first be mixed with the contents of container 412.

Figure 13 illustrates a variant of the fifth embodiment of the present invention in which like numerals designate like parts with the addition of the prefix "5". Only those differences with respect to the fifth embodiment are discussed in detail. A cap equivalent to cap 486 is not shown in Figure 13, but would be provided to close the top of conduit 575.

In this sixth embodiment, the entire first portion is transparent and radially inwardly directed teeth 556 of the second portion 516 are arranged so as to engage a complementary lip 558 of the first portion so as to permit relative rotational movement between portions 514 and 516, but prevent relative axial movement.

In addition, an alternative form of valve means is provided and comprises holes 584b and 584a provided respectively in the conduit 575 and sleeve-like extension 582. In the closed position, the holes are offset to prevent the passage of the contents of the container therethrough, but once rotated into the open position are aligned to allow the mixed contents of the container to pass therethrough. To assist a user of the dispenser in turning the dispenser from a closed to an open position and back, a tooth or projection 576 is provided on the conduit 575. In the closed position this engages with hole 584a, and in the open position with a recess 577 provided on sleeve-like portion 582, which is 180° out of alignment with hole 584a. This arrangement provides the user with a positive indication of when the dispenser is in the open or closed position. In other embodiments, the positions of the projection 576 and hole 577 on the conduit and sleeve-like portion may be reversed.

Figure 14 shows a seventh embodiment of the present invention in which like parts are designated by like numerals with the addition of the prefix "6". Again, only differences with respect to the preceding embodiments are discussed in detail.

- 5 In this embodiment the plug 676 is directly connected to the cap 686 by one or more connecting bars 692. The bars extend through apertures 678 between arms 679 that support plug 688.

Thus, when cap 686 is lifted to the position shown in broken lines in Figure 14, plug  
10 676 is lifted clear of hole 684. A user then waits until the contents of reservoir 622 are dispensed into container 612 before then pouring or consuming the mixed contents of the container via the reservoir and cap 686.

In a variant of this embodiment of the present invention, plug 684 may be connected to  
15 a user engageable portion of the dispenser 610 through which the container contents may not be poured. Instead, the dispenser may be removed from the container as in embodiments one to four described above to allow pouring.

Figure 15 illustrates an eighth embodiment of the present invention in which like parts  
20 have been designated where possible by like numerals with the addition of the prefix "7". This embodiment shows a dispenser of the type disclosed in the fourth embodiment to which a sports cap assembly 785 has been mounted. The material 720 is dispensed from the reservoir 722 into the container 712 in the same way as in the fourth embodiment. The mixed contents of the container 712 may then be poured or  
25 consumed via the reservoir 722 and sports cap assembly 785.

Figures 16 and 17 show a ninth embodiment of the present invention in which like parts have been designated where possible by like numerals, but with the addition of the prefix "8". Only differences with respect to the preceding embodiments are discussed  
30 in further detail.

In this embodiment, the first wall 832 of the dispenser 810 is arranged as a tubular axially extending sleeve provided with two holes 834 therein at its lower end. The lower end of the sleeve is closed by a plug 895 that defines the bottom of holes 834 and has an enlarged lower portion that defines an annular abutment surface 836.

- 5 Axially intermediate the reservoir 822 and first wall 832 of the first portion 814 is a downwardly facing annular surface 893 having two pegs 894 circumferentially equidistant from each other and projecting downwardly therefrom.

- 10 The second portion 814 is provided with a second wall 840 in the form of an axially extending cylindrical bore 840. An upwardly facing annular surface 891 is provided in the second portion 816 radially intermediate the bore 840 and the outer face of the portion. Two downwardly extending circular recesses 892 are provided in surface 891 and are dimensioned and positioned so as to be capable of accommodating the pegs 894.

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The dispenser may be assembled as follows:

- 20 The reservoir 822 is filled with liquid 820 whilst inverted, having had pegs 894 fitted thereto. The reservoir 822 is then fitted to the second portion 816 such that the first wall 832 fits inside the second wall 840. The plug 895 is then inserted into the base of the reservoir 822 to complete the first portion 814. To ensure it does not become dislodged during storage and transportation, the plug 895 may be secured to the reservoir 822 by adhesive, heat fusing, a screw thread or by other suitable means. Alternatively, the plug 895 may be press fitted to the reservoir with an interference type  
25 connection arrangement (not shown) between the two components ensuring that they do not become separated. The dispenser is now in the condition shown in Figure 16 and may be secured to the neck of a bottle or other container (not shown) by threads 844. The reservoir may alternatively be filled once the dispenser has been fully assembled.

- 30 The dispensing operation of the dispenser 810 is as follows:

Starting from the position shown in Figures 16 and 18 in which the first portion 814 is in a raised position relative to the second portion 816, the user rotates the first portion clockwise relative to the second portion such that pegs 894 that were previously circumferentially misaligned with recesses 892 become circumferentially aligned (a first twisting step). Subsequently, the user may push downwardly on the first portion such that pegs 894 enter their respective recesses 892 as illustrated in Figures 17 and 19 (a second depressing step). This depressing action reveals holes 834 that are provided in the first wall and enables the liquid 820 to pass from the reservoir 822 into the container to which dispenser 810 is attached. This flow is illustrated by arrows E in Figure 17. The user may permit the entire contents of a reservoir 822 to be dispensed into the container. Alternatively a proportion of the liquid 820 may be dispensed and the user may then lift the first portion 814 to cover holes 834 and stop the flow of liquid. To ensure that any remaining liquid is not accidentally dispensed, the user may then twist the first portion 814 anticlockwise or clockwise relative to the second portion back to the position shown in Figure 18. To consume the mixed contents of the container to which the dispenser 810 is attached, the dispenser 810 may be unscrewed therefrom.

Turning to Figures 20, 21 and 22 a tenth embodiment of the present invention is illustrated in which like parts have been designated where possible by like numerals with the addition of the prefix "9".

The dispenser 910 shown in these Figures is essentially a variant of the dispenser of the eighth embodiment that is provided with a through conduit 975 that extends through the reservoir 922 and plug 995 and which is capped by a sports cap 985 in a similar manner to the dispenser of the fifth embodiment.

The liquid 920 is dispensed into the container to which the dispenser is attached in a direction F in a similar manner to the dispenser of the ninth embodiment. Once dispensing is complete, the dispenser 910 may then be reclosed and the mixed contents of the container to which it attached (not shown) discharged via the conduit 975 and sports cap in a direction G as illustrated in Figure 22.

Turning to Figures 23 and 24, an eleventh embodiment of the present invention is shown in which like parts have been designated by like numerals with the addition of the prefix "10". Only differences in this embodiment compare to the preceding  
5       embodiments are discussed in detail below.

This embodiment utilises a similar principle to the ninth and tenth embodiments but dispenses by a two step twist and lift mechanism. It can be seen that pegs 894 are inverted in comparison with embodiment of Figure 16, and are provided on an  
10       extension of downwardly extending sleeve 1032. Complementary upwardly extending recesses 1092 are provided on a downwardly facing surface 1091 of the second portion 1016.

A plug 1076 extends from the bottom of the first portion and is arranged, in a sealed  
15       state, to plug a hole 1084 in wall 1040.

In this embodiment, lifting of the first portion 1014 relative to the second portion 1016 is prevented whilst the pegs 1094 are circumferentially offset from the corresponding recesses 1092. Once a user has twisted the first portion 1014 relative to the second  
20       portion 1016 to bring the pegs into circumferential alignment with the recesses, the first portion may be lifted relative to the second portion, thus removing plug 1076 from the hole 1074, thereby allowing the liquid 1020 in reservoir 1022 to flow via pass-through holes 1096 in a direction H into the container (not shown), upon which the dispenser is attached.

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As in the ninth and tenth embodiments, the dispensing operation may be halted by reversing the above procedure.

Figures 25 and 26 illustrate a twelfth embodiment of the present invention in which like  
30       parts are again designated by like numerals but with the addition of the prefix "11". The dispenser 1110 of this embodiment operates under a similar principle to the dispenser of the eleventh embodiment except that a pass-through conduit 1175 and

sports cap assembly 1185 is provided thereon. It can be seen that the conduit 1175 is used to mount plug 1176 to the first portion 1114 of the dispenser, as well as enabling mixed liquid from the container to which the dispenser is attached to be discharged from the container via the sports cap whilst the dispenser is in place on the container.

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Figures 27 and 27A show thirteenth embodiment of the present invention that is a variant of the ninth embodiment and in which like parts have been designated where possible by like numerals, but with the addition of the prefix "12". Only differences with respect to the preceding embodiments are discussed in further detail.

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It can be seen that the primary difference between this embodiment and the ninth embodiment is that the first and second portions 1214 and 1216 are one-piece mouldings. That is to say, plug 1295 and pegs 1294 of the first portion are integrally formed with the remainder of the first portion using a suitable moulding technique.

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In order to permit the fitting of the two portions together, the fixed abutment surface 836 of the ninth embodiment is replaced by a resilient lip 1236 that extends around the radially outer periphery of the plug in an interrupted or uninterrupted manner.

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During assembly, the lip retracts to enable it to slide along the second wall 1240, before extending to prevent or inhibit the removal of the first portion 1214 from the second 1216 when fully assembled. Although it is envisaged that the face-to-face relation between the first and second walls 1232 and 1240 primarily acts as a seal prior to the dispensing operation, lip 1236 may also perform this function if it is uninterrupted.

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It should further be noted that in this embodiment, a number of surfaces within the reservoir 1222, such as the edges of holes 1234, are bevelled to assist in the flow of material from the reservoir 1222 during the dispensing operation.

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The dispensing operation of the dispenser 1210 is similar to that described in relation to dispenser 810 of the ninth embodiment.



Referring to Figures 28, 28A and 28B, a further embodiment of the dispenser is shown that includes a tamper-evident seal. Again, like parts have been designated where possible by like numerals, but with the addition of the prefix "13". Only differences with respect to the preceding embodiments are discussed in further detail.

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The uppermost edge of second portion 1316 is provided with one or more moulded or formed L-shaped slots 1397 that open radially inwardly. The upper face of an undercut portion 1397a of the slot 1397 is provided with a recess 1398. The recess 1398 is arranged to engage a complementary projection 1399 on an otherwise substantially planar wing 1389 formed from a radial outer edge of the first portion 1314 in a non-releasable manner. The connection between the wing 1389 and first portion 1314 has a relatively small cross-sectional area to enable the wing to become detached with a relatively low force.

15 When the dispenser is assembled, wing 1389 is angularly aligned with an open portion 1397b of slot 1397 so that it may be lowered into the slot from above, before rotation of the first portion 1314 anticlockwise relative to the second portion 1316 causes the wing to come to rest in the undercut portion 1397a, the movement being indicated by arrow L.

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In this position, projection 1399 engages recess 1398 such that the reverse, clockwise movement is prevented unless the wing 1389 is sheared from the first portion. Similarly, further anticlockwise rotation of the first portion 1314 causes the wing to shear. Thus, once the dispenser is assembled, it is evident to dispenser users if an attempt has been made to disassemble the dispenser (clockwise rotation) or to dispense the contents of the reservoir 1322 (anticlockwise rotation), thereby providing a safeguard for the quality and safety of contents of the dispenser.

It will be appreciated that numerous changes may be made to the ninth, tenth, eleventh, 30 twelfth, thirteenth and fourteenth embodiments of the present invention. For example, alternative means may be provided to control the two step twist and depress or twist and lift dispensing process. Such means may be a cam and cam follower arrangement such

as slots and corresponding pins provided in the first and second walls, or in the contacting faces of the reservoir and the second portion or steps being provided in surfaces 891, 991, 1091, 1191, 1291 and 893, 993, 1093, 1193, 1293. In the ninth and tenth embodiments, the enlarged base providing surface 836, 936 of plug 895, 995 may  
5 be omitted, thereby enabling the first portion to be manufactured as a single piece and inserted into the second portion, however suitable alternative means may need to be provided to prevent the first and second parts becoming separated in use. A detent or stop mechanism may be provided to limit the extent of relative rotation between the first and second portions. An alternative form of tamper evident seal or frangible strip  
10 or connection may be provided between the first and second portions. A ramp may be provided between the first and second portions such that during the twisting step the portions become separated (ninth and tenth embodiments) or closer (eleventh and twelfth embodiments) to a greater degree before depression or lifting of the first portion is possible. The ramping action may be resiliently resisted, with the energy stored  
15 resiliently being released to achieve the depressing or lifting step without it being necessary for a user to depress or lift the first portion 814. The sealing of the holes in the first wall in the case of twist and depress versions may be achieved in the closed condition by an appropriately dimensioned neck of the container. Various parts shown as separate in Figures 16 to 26 (eg the pegs) may be formed integrally with other  
20 components (eg the reservoir) to minimise assembly costs.

It will be appreciated that a two step twist and depress or twist and lift dispenser reduces the risk of accidental dispensing during transportation and storage, and furthermore provides the end user with a clear indication of when the dispenser is in the  
25 dispensing position whilst giving freedom to choose how much material may be dispensed.

It will be appreciated by those skilled in the art that any suitable combination of means for dispensing material from the reservoir into the container may be combined with any  
30 suitable means for then removing the contents of the container without having to detach the dispenser from the container that either employ a conduit or not. It will also be appreciated that in those embodiments that employ a conduit, other types of seals at the

base of the conduit may be used, such as a membrane that may be pierced by suitable piercing means due to manipulation of the dispenser by a user. Alternatively, if an appropriate seal (such as a sports cap) is provided at the top of the conduit, a seal may be omitted from the bottom of the conduit.

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It will further be appreciated that the dispensers described above all offer a more convenient way of storing to materials or substances that require subsequent mixing, and that the dispensers then enable mixing to be achieved substantially without risk of contamination or spillage occurring in a user friendly-manner. The provision of  
10 separate material to be dispensed also gives the consumer confidence that the added material for which they are paying is present in their product, since the consumer is adding it themselves.

It should be appreciated that terms such as "upwardly", "downwardly", "top" and  
15 "bottom" used herein are for ease of reference only, and that such terms should not be construed to be limiting.

It will be further appreciated that numerous changes may be made within the scope of the present invention. For example, the second wall may be provided over the mouth of  
20 the container rather than on the second portion. The dispenser may be adapted so as to provide a positive pressure to the material during dispensing or to permit the relative pressures of the reservoir and container to be substantially equalised prior to dispensing eg by having means to enable pressure in the container to be vented prior to or during dispensing. A scale may be provided on the reservoir to enable the amount of material  
25 being dispensed to be measured out and the barrier means reclosed. Any suitable arrangement for piercing the first or second wall may be used. As an alternative to piercing, a reclosable valve may be opened or depressed by manipulation of the dispenser. The dispenser may be non circular in shape and may be adapted to dispense solids such as powders and tablets (eg by providing larger and/or a greater number of  
30 holes), and gases (by providing a gas tight seal in the barrier means) into a container in addition to liquids as described above. It is envisaged that the third embodiment illustrated in Figure 8 would be particularly suited to this purpose. A tamper evident

- connection of any suitable known kind may also be provided between the dispenser and container to which it is secured. More than one reservoir may be provided in the dispenser, so that a user may select, for example, a particular compound or flavour to be added to a drink or other material held in a container from two or more different compounds or flavours held in the dispenser. The multiple reservoirs may be arranged such that the contents thereof can only be dispensed into the container in a particular sequence to ensure that, for example, a chemical reaction within the container occurs in a predetermined manner.
- As well as being used in relation to alcoholic and non alcoholic drinks, the dispenser may be used in numerous other applications. For example, the dispenser may be used to add herbs, spices or other flavourings to a "cook-in" sauce or ready meal provided in the container, dispensing fruits or other flavourings into yoghurts, as well as in numerous other food and beverage related applications. The dispenser may also be used for biological and chemical applications (such as testing kits) in which a reactive compound could be dispensed from the dispenser into a container without the risk of spillage or contamination, as well as for cosmetics and health and beauty products such as shampoos and conditioners. The dispenser may further have applications in household and vehicle related products (eg the dispensing of two-stroke oil into petroleum), and in pharmaceutical or medical products.

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